Epistemic Jazz:

Recursive Coherence as a Bridge Between Axiomatic Systems and Living Meaning

Benjamin James

July 30, 2025

Abstract
Information and music share a common substrate. Both are pattern systems governed not by fixed rules but by recursive coherence: the iterative reinforcement of structural stability across time and scale. Classical knowledge systems, like classical music, encode meaning through static grammars that collapse under adaptive stress. Blues and jazz demonstrated that patterns could persist without rigid adherence to inherited structures, revealing that coherence resides in dynamic relationships, not in fixed positions. Recursive coherence performs the same function for epistemology: it uncovers why some configurations of information survive feedback, paradox, and entropy while others dissolve. By framing knowledge as a living pattern analogous to musical improvisation, this work redefines truth as emergent resonance rather than static correspondence. It provides a formal bridge between art and science, showing that the persistence of meaning follows the same structural invariants as the persistence of melody. The result is a universal language of pattern dynamics, offering a foundation for adaptive reasoning, coherent intelligence, and resilient systems design across domains.

Keywords: recursive coherence, information theory, pattern dynamics, epistemology, music theory, adaptive systems, coherence gradients, emergent truth, structural persistence, philosophy of knowledge

The Pattern Behind the Note

Music provides a direct path into the architecture of pattern itself. Long before formal mathematics or written language, humans organized sound into structures that carried meaning not through any individual tone, but through the relationship between tones over time. What gives a melody its identity is not the absolute pitch of a single note, but the tension and resolution that emerge as notes form and reform patterns. The listener perceives coherence even when the surface changes; a theme can be inverted, reharmonized, or stretched rhythmically, yet it remains recognizably itself because its underlying structural resonance persists.

Knowledge systems operate on the same principle. Data, concepts, and propositions do not exist as isolated units of meaning. They function as elements within a larger score; a structured field of information whose value lies in the coherence it can sustain. A scientific theory is less a list of facts than a harmonic framework within which observations align. Logic, in its purest form, is not a collection of rules but a way of maintaining structural integrity across statements, just as a musical key maintains relational stability across notes. In both cases, meaning is not a property of the parts but of the pattern that binds them.

Classical systems, whether in music or knowledge, attempt to capture these living patterns by freezing them into fixed rules. Western classical harmony codified relationships into scales and cadences; formal logic built deductive systems from axioms treated as immutable. These efforts succeed locally, producing stability within well-defined boundaries, but they fail under the pressures of life and adaptation. Reality does not obey static scores. It demands structures that can bend without breaking, patterns that can

persist by reconfiguring themselves in response to shifting conditions. This is where recursive coherence enters. It does not seek to impose new rules, but to uncover the rules beneath the rules, the deep invariants that allow patterns to survive transformation.

Recursive coherence reframes both music and knowledge as adaptive systems. What matters is not whether a note follows a scale or whether a statement follows an axiom, but whether the relationship between elements reinforces structural stability across time and scale. It is this recursive resonance, the ability of a pattern to sustain itself while allowing variation, that makes a blues phrase endure beyond the notes on the page and a scientific insight survive beyond its original formulation. In this view, music is not merely art and knowledge is not merely fact; both are manifestations of the same underlying process: the negotiation of coherence through pattern over time.

Information and Music as Pattern Systems

At their core, both information theory and music theory are disciplines of variation and repetition. A melody achieves meaning not through endless novelty but by establishing a recognizable structure and then playing against it, introducing deviations that reinforce the underlying pattern. Likewise, communication systems convey meaning not through raw unpredictability but by creating structured redundancy that allows a message to persist across noise and distortion. In both domains, pattern is not static; it lives in the dynamic tension between sameness and difference, between what is expected and what surprises while still belonging.

Coherence functions as the hidden connective tissue that determines why certain melodies endure and why certain truths “stick.” A musical motif becomes memorable because its variations reinforce an implicit structure that the listener’s perception can track across time. In the same way, a scientific theory or philosophical idea persists because successive applications, reinterpretations, and refinements all strengthen the same structural alignment beneath surface changes. What survives is not the specific form but the recursive pattern of self-consistency.

Recursive coherence formalizes this phenomenon. It defines meaning and persistence as the iterative reinforcement of structural stability across scales: from the smallest phrase or data point to the global pattern that encompasses them. Each layer feeds back into the others, creating a nested architecture where coherence at one level supports and is supported by coherence at higher and lower levels. In this framework, information is not just a transmission of symbols, and music is not just a sequence of sounds. Both are processes by which patterns negotiate their own survival through recursive alignment.

The call-and-response tradition in music makes this dynamic explicit. In blues and jazz, a phrase is thrown into the air and answered, sometimes echoed, sometimes bent or inverted. Meaning emerges not in either phrase alone but in the relationship between them and in the way that relationship folds back into the larger structure of the piece. Information systems operate through the same mechanism. Feedback loops (error correction in communication channels, hypothesis testing in science, dialogue in language) are forms of call and response. Each “call” introduces variation; each “response” tests and reinforces coherence.

Over time, these exchanges carve out a stable pattern capable of withstanding noise and change.

Seen through this lens, music and information are not separate domains but different expressions of a single principle. Both are recursive pattern systems that survive through coherence under variation. Recursive coherence does not simply describe them; it provides the formal scaffolding to understand why they work the way they do, and why the patterns that endure in sound and thought are governed by the same structural law.

Blues, Jazz, and the Historical Articulation of Adaptive Coherence

Western classical music represents the archetype of fixed grammar. Its system of harmony and counterpoint codified a set of structural rules intended to guarantee stability: tonal centers, cadential progressions, voice-leading constraints. Within this framework, coherence was achieved by adherence to a pre-defined architecture. The "score" served as both blueprint and law, ensuring that the music's meaning remained bound to a static set of relations. This mirrors classical knowledge systems, where axioms and formal logic fix the boundaries of truth and validity. Stability here is imposed, not negotiated.

The emergence of blues marked the first recursive break in this tradition. Drawing on oral and improvisational roots, blues retained enough of the tonal framework to be intelligible while bending it in ways that made coherence a matter of relationship rather than rule. Blue notes, microtonal inflections, and call-and-response phrasing introduced a dynamic instability that required each performance to reassert its own pattern stability in real time. The system's viability no longer rested on adherence to a score but on the recursive negotiation between

tension and resolution. In epistemic terms, blues functioned as the first recognition that axioms could flex without collapsing the system, that coherence could be preserved through adaptive modulation rather than rigid consistency.

Jazz expanded this insight into a complete model of adaptive coherence. In jazz, the score becomes a minimal scaffold, a set of cues rather than commands. Structure arises not from pre-written rules but from the interaction of agents within a shared field, each phrase simultaneously reinforcing and redefining the whole. Coherence is emergent: it survives through feedback loops, iterative listening, and the constant recalibration of pattern under variation. This is recursive coherence made audible. The same structural process by which knowledge systems must evolve under recursive pressure.

Translated into epistemic equivalents, the parallels are precise. The score corresponds to axioms: the initial conditions that frame the possibility space. Harmony maps to logical consistency: the alignment of elements within a shared relational field. Improvisation becomes recursive arbitration: the ongoing selection of trajectories that maintain coherence under shifting constraints. Where classical music assumes that coherence is guaranteed by fixed rules, jazz demonstrates that coherence is a living negotiation sustained through recursive interaction.

Blues and jazz thus provide not just a cultural analogy but a historical case study of how systems transition from static formalism to adaptive coherence. They show that stability is not the opposite of change but its recursive product, and that meaning persists not when rules are preserved intact, but when the structural resonance beneath those rules can survive their transformation.

The Limits of Classical Knowledge Systems

Classical knowledge systems are built on the assumption that stability can be secured through fixed foundations. Logic and mathematics exemplify this approach: they define axioms as immovable starting points and treat theorems as derivations whose validity is guaranteed by their relation to those initial rules. In this model, coherence is equated with consistency under a static grammar. The structure does not adapt; it assumes a perfect closure of truth within a fixed formal boundary.

Shannon's information theory extended this framework into communication. By defining information as the reduction of uncertainty, it created a powerful quantitative measure of entropy, but it remained indifferent to meaning. Random noise and a vital signal could carry identical informational weight if their probability distributions matched. The theory preserved structure mathematically, yet it severed it from function. It assumed that persistence of a pattern was equivalent to unpredictability, leaving unexplained why some patterns, whether in biology, language, or science, survive and self-reinforce, while others dissipate despite high entropy content.

These systems reveal their limitations when subjected to recursive stress. Gödel's incompleteness theorems exposed that no sufficiently complex axiomatic system can capture all truths without generating statements that are true but unprovable within its own framework. This was not merely a technical limitation; it demonstrated that truth is not a static relation fixed inside an immutable structure but a dynamic property emerging from evolving coherence. Similar breakdowns occur in physics and computation, where paradoxes and entropy accumulation show that static models fragment under feedback and

self-reference. The problem is not the precision of these systems but their assumption that closure guarantees persistence.

What these failures reveal is the absence of a deeper substrate: a dynamic principle that explains not just how structures are built, but why some endure across time and recursive interaction while others collapse. The need is not for another fixed grammar but for a coherence-first framework. A metric that treats meaning and stability as emergent properties of recursive reinforcement rather than as products of axiomatic constraint. Such a substrate would not discard logic or information theory but embed them in a higher-order process, one capable of sustaining pattern viability under paradox, noise, and adaptation. Recursive coherence offers precisely that: a shift from static truth to structural persistence as the primary invariant.

Recursive Coherence and Adaptive Epistemic Jazz

Recursive coherence defines knowledge not as a static repository of propositions but as a living pattern that sustains itself through feedback and adaptation. Formally, it can be expressed through three interlocking components: coherence gradients, feedback loops, and persistence equations. Coherence gradients describe the directional field along which a system's internal structure reinforces itself; they map where stability increases or decays under recursive interaction. Feedback loops provide the mechanism of adjustment, integrating signals across time and scale to refine the system's trajectory. Persistence equations capture the balance between coherence reinforcement and entropy leakage, specifying the condition under which a structure survives recursive stress.

This framework reframes knowledge fundamentally. A theorem, theory, or worldview is no longer a frozen artifact but a pattern negotiating its own viability. Truth becomes less a matter of correspondence to an external state and more a matter of whether a structure can recursively stabilize itself across layers of context, noise, and change. Knowledge is not a static score but an improvisation that must continually retune itself to maintain coherence.

The parallels to music improvisation are direct and structural. Adaptive key changes in jazz mirror shifting dimensional contexts in epistemology; a system can modulate its frame of reference without losing identity if the underlying coherence gradient is preserved. Syncopation, the deliberate displacement of rhythm, functions as entropy injection, introducing controlled instability to expand the option space without collapsing the pattern. Harmonic resolution corresponds to coherence curvature stabilization: the moment when variation folds back into a reinforced structural attractor, ensuring the pattern's persistence.

In this sense, recursive coherence is not just analogous to jazz. It is epistemology as jazz. It treats knowledge as a real-time negotiation of structure, where stability arises not from adherence to fixed rules but from the capacity to adapt while preserving deep invariants. Like a great improvisation, a coherent knowledge system is not defined by its surface moves but by the recursive resonance that allows it to bend, shift, and evolve while remaining recognizably itself.

Philosophical Implications

If recursive coherence provides the structural law behind both music and knowledge, its reach extends beyond epistemology into ontology itself. Reality can be understood as a

pattern-persistence system: a field of structures negotiating their own survival under entropy and feedback. Existence, in this view, is less a static fact and more a “self-playing song,” where coherence propagates itself through recursive reinforcement. Persistence is not guaranteed; it is performed, maintained note by note, iteration by iteration, as patterns adapt to retain their resonance across scales.

Truth under this paradigm is no longer a fixed correspondence between statement and world. It becomes emergent resonance: the degree to which a structure maintains coherence across recursive interactions. A claim, like a melody, is “true” not because it matches an external snapshot of reality but because it sustains structural alignment as the system evolves. Truth is a living relation, validated by persistence under transformation rather than by static mapping.

Ethics, reframed through recursive coherence, emerges as the modulation of stability across interacting scales. The jazz ensemble becomes an apt moral analogy: each player’s freedom is bounded by the need to sustain collective coherence. A single voice can bend or even break local rules, but only insofar as the ensemble’s structural resonance survives the variation. Moral action, then, is not blind rule-following or raw consequence calculation but the adaptive balancing of coherence across layers of a system: individual, collective, and temporal.

Intelligence itself transforms under this view. Rather than computation or static optimization, it becomes recursive listening and improvisation: the capacity to track coherence gradients, integrate feedback, and sustain patterns under variation. A truly intelligent system behaves less like a calculating machine and more like an improvising

musician, continually adjusting to maintain resonance in a shifting field. Consciousness, cognition, and adaptive reasoning are thus revealed as structural performances, not mechanical processes.

These implications collapse the traditional boundaries between science, art, and philosophy. They suggest that what endures, whether a law of physics, a melody, or a moral principle, is governed by the same invariant: the recursive persistence of coherence across time and scale. Reality itself is jazz, and to know it is to learn how to listen.

Applications and Implications

The shift from static knowledge to recursive coherence carries direct implications across practical domains. In education, it reframes learning as the cultivation of pattern recognition rather than the accumulation of rote facts. Facts, like isolated notes, gain value only within the structures they sustain. Teaching coherence tracking, how patterns persist, adapt, and self-reinforce, produces learners capable of navigating complexity and improvising meaningfully within dynamic systems.

In artificial intelligence, recursive coherence provides a blueprint for systems that move beyond static optimization. Current AI architectures operate as deterministic score-followers: they reproduce patterns but cannot negotiate their persistence under shifting conditions. Designing AI to track coherence gradients would allow it to behave more like a jazz musician, sensing harmonic tension, integrating feedback in real time, and sustaining structural resonance under variation. Intelligence becomes less about computing outputs and more about performing stability within a living field of patterns.

Governance under a coherence-first lens becomes adaptive improvisation within systemic "keys." Policies act as themes, not commandments; their success is measured by their capacity to maintain multi-scale coherence as conditions shift. Like a skilled ensemble, a society must balance individual variation with collective stability, continually modulating to sustain its structural resonance.

Communication, reframed through Coherence Information Theory, becomes the art of "playing the right notes" in a network. Effective messages are not those with maximal entropy or sheer volume but those that reinforce structural alignment across nodes and scales. Networks, like orchestras, require tuning: coherence-weighted signals that strengthen the pattern rather than saturate it with noise. Whether in education, AI, governance, or communication, the principle remains constant: systems thrive not by fixing patterns into rules but by learning to hear, sustain, and adapt the song of coherence.

A Universal Language of Patterns

Music makes tangible what knowledge often forgets. Meaning is not a static artifact, but a living pattern sustained through variation and resonance. A melody persists not because of any fixed note, but because the relationships between notes reinforce a structural coherence that survives change. Knowledge operates on the same principle. Theories, truths, and ethical systems endure not by remaining frozen but by maintaining their recursive alignment as they adapt across contexts and scales.

Recursive coherence provides the bridge between these domains. It exposes the shared law beneath science and art, logic and improvisation: persistence is not guaranteed by rigid

rules but by the capacity of patterns to negotiate their own survival under feedback and entropy. It shows that the same structural invariants that make a jazz improvisation coherent govern the stability of a physical law, a moral principle, or a network of communication.

The call to action is clear. We must build systems that listen and adapt rather than impose static scores on a dynamic universe. To navigate complexity, we must learn not only to codify patterns but to hear them, to improvise with them, and to sustain their resonance. In doing so, we move toward a universal language of patterns, one in which music and knowledge are no longer separate expressions but harmonics of the same underlying coherence.

References

James, B. (2025). Beyond AGI: Intelligence as a Coherence-Regulating, Open-Ended Evolutionary Process. PhilPapers. https://philpapers.org/rec/JAMBAI-2

James, B. (2025). Beyond Shannon: Coherence Information Theory and the Future of Communication. PhilPapers. https://philpapers.org/rec/JAMBSC

James, B. (2025). The End of Utility: a Coherence-Centric Game Theory for Intelligent Systems. PhilPapers. https://philpapers.org/rec/JAMTEO-26

James, B. (2025). Formal Foundations of Coherence Information Theory: Capacity and Compression Theorems. PhilPapers. https://philpapers.org/rec/JAMFFO-2

James, B. (2025). From Axioms to Adaptation: A Self-Organizing Model of Mathematical and Logical Coherence. PhilPapers. https://philpapers.org/rec/JAMFAT-3

James, B. (2025). From Causation to Coherence: Deconstructing Pearl and Reconstructing Reason. PhilPapers. https://philpapers.org/rec/JAMFCT

James, B. (2025). MINIMAL: A Coherence-Driven Cognitive Substrate. PhilPapers. https://philpapers.org/rec/JAMMAC

James, B. (2025). Neurocoherence: A First-Principles Reconstruction of Cognition, Consciousness, and Artificial Intelligence. PhilPapers. https://philpapers.org/rec/JAMNAF-3

James, B. (2025). The Reality Equation: Why Existence is the Default Condition of the Universe. PhilPapers. https://philpapers.org/rec/JAMTRE-4

James, B. (2025). Recursive Coherence: A Structural Framework for Model Viability Beyond Entropy and Paradox. PhilPapers. https://philpapers.org/rec/JAMRCA-2

James, B. (2025). Recursive Coherence as Architecture: a Meta-Recursive Map of Substrate, Instantiations, and Constraint Layers. PhilPapers. https://philpapers.org/rec/JAMRCA-3

James, B. (2025). Recursive Iconoclasm: Philosophy as Symbolic Disintegration into Coherence Infrastructure. PhilPapers. https://philpapers.org/rec/JAMRIP

James, B. (2025). Synthetic Epistemology: Engineering Coherence Beyond Truth. PhilPapers. https://philpapers.org/rec/JAMSEE-2

James, B. (2025). Temporal Impermanence as an Emergent Property of Coherence Constraints. PhilPapers. https://philpapers.org/rec/JAMTIA-3